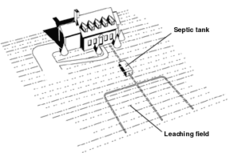
**Septic drain field**

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**Septic drain fields** are used to remove contaminants and impurities from the liquid that emerges from the [septic tank](http://en.wikipedia.org/wiki/Septic_tank). Another term for this is a **leach field** or leach drain. A [septic tank](http://en.wikipedia.org/wiki/Septic_tank), the septic drain field, and the associated piping compose a complete [septic system](http://en.wikipedia.org/wiki/Septic_system). The septic drain field is effective for disposal of organic materials readily [catabolized](http://en.wikipedia.org/wiki/Catabolism) by a microbial [ecosystem](http://en.wikipedia.org/wiki/Ecosystem). The drain field typically consists of an arrangement of trenches containing perforated pipes and porous material (often [gravel](http://en.wikipedia.org/wiki/Gravel)) covered by a layer of [soil](http://en.wikipedia.org/wiki/Soil) to prevent [animals](http://en.wikipedia.org/wiki/Animal) and [surface runoff](http://en.wikipedia.org/wiki/Surface_runoff) from reaching the [wastewater](http://en.wikipedia.org/wiki/Wastewater) distributed within those trenches.[[1]](http://en.wikipedia.org/wiki/Septic_drain_field#cite_note-0) Primary design considerations are hydraulic for the volume of wastewater requiring disposal and catabolic for the long-term [biochemical oxygen demand](http://en.wikipedia.org/wiki/Biochemical_oxygen_demand) of that wastewater.

[](http://en.wikipedia.org/wiki/File:Landpeople_s_cc8.PNG)

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[Septic tank](http://en.wikipedia.org/wiki/Septic_tank) and septic drain field.

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**[**[**edit**](http://en.wikipedia.org/w/index.php?title=Septic_drain_field&action=edit&section=1)**] Hydraulic design**

Many health departments require a [percolation test](http://en.wikipedia.org/wiki/Percolation_test) ("perc" test) to establish suitability of drain field soil to receive septic tank effluent. An [engineer](http://en.wikipedia.org/wiki/Engineer) or licensed designer may be required to work with the local governing agency to design a system that conforms to these criteria.

Wastewater from [toilets](http://en.wikipedia.org/wiki/Toilet) is assumed to contain [bacteria](http://en.wikipedia.org/wiki/Bacteria) and [viruses](http://en.wikipedia.org/wiki/Virus) capable of transmitting disease. [Disinfection](http://en.wikipedia.org/wiki/Disinfection) methods used prior to surface disposal of municipal [sewage](http://en.wikipedia.org/wiki/Sewage) cannot be used with septic tanks because disinfection would prevent wastewater treatment by killing the septic tank and soil ecosystems catabolizing the [putrescible](http://en.wikipedia.org/wiki/Putrifaction) contents of the wastewater. A properly functioning drain field holds and deactivates [pathogens](http://en.wikipedia.org/wiki/Pathogen) before they leave the drain field soil.

The goal of percolation testing is to ensure the soil is permeable enough for septic tank effluent to [percolate](http://en.wikipedia.org/wiki/Percolate) away from the drain field, but fine grained enough to filter out pathogenic bacteria and viruses before they travel far enough to reach a [water well](http://en.wikipedia.org/wiki/Water_well) or surface water supply. Coarse soils – [sand](http://en.wikipedia.org/wiki/Sand) and gravel – can transmit wastewater away from the drain field before pathogens are destroyed. [Silt](http://en.wikipedia.org/wiki/Silt) and [clay](http://en.wikipedia.org/wiki/Clay) effectively filter out pathogens but allow very limited wastewater flow rates.[[2]](http://en.wikipedia.org/wiki/Septic_drain_field#cite_note-1) Percolation tests measure the rate at which clean water disperses through a disposal trench into the soil. Several factors may reduce observed percolation rates when the drain field receives [anaerobic](http://en.wikipedia.org/wiki/Anaerobic) septic tank effluent:[[3]](http://en.wikipedia.org/wiki/Septic_drain_field#cite_note-2)

* Microbial colonies catabolizing soluble organic compounds from the septic tank effluent will adhere to soil particles and reduce the interstitial area available for water flow between soil particles. These colonies tend to form a low-permeability [biofilm](http://en.wikipedia.org/wiki/Biofilm) of gelatinous slime at the soil interface of the disposal trench.[[4]](http://en.wikipedia.org/wiki/Septic_drain_field#cite_note-3)
* Insoluble particles small enough to be carried through the septic tank will accumulate at the soil interface of the disposal trench; non-biodegradable particles like mineral soil from laundry or vegetable washing, or bone and eggshell fragments from garbage disposals will remain to fill interstitial areas formerly available for water flow out of the trench.[[5]](http://en.wikipedia.org/wiki/Septic_drain_field#cite_note-4)
* Cooking fats or [petroleum](http://en.wikipedia.org/wiki/Petroleum) products emulsified by [detergents](http://en.wikipedia.org/wiki/Detergent) or dissolved by [solvents](http://en.wikipedia.org/wiki/Solvent) can flow through prior to anaerobic liquifaction when septic tank volume is too small to offer adequate residence time, and may congeal as a [hydrophobic](http://en.wikipedia.org/wiki/Hydrophobic) layer on the soil interface of the disposal trench.[[6]](http://en.wikipedia.org/wiki/Septic_drain_field#cite_note-hammer-5)
* Rising groundwater levels may reduce the available [hydraulic head](http://en.wikipedia.org/wiki/Hydraulic_head) (or vertical distance) causing gravitational water flow away from the disposal trench. Effluent initially flowing downward from the disposal trench ultimately encounters groundwater or impermeable rock or clay requiring a directional shift to horizontal movement away from the drain field. A certain vertical distance is required between the effluent level in the disposal trench and the water level where the effluent is leaving the drain field for gravitational force to overcome [viscous frictional](http://en.wikipedia.org/wiki/Viscosity) forces resisting flow through porous soil. Effluent levels in the vicinity of the drain field will appear to rise toward the ground surface to preserve that vertical distance difference if groundwater levels surrounding the drain field approach the level of effluent in the disposal trench.[[6]](http://en.wikipedia.org/wiki/Septic_drain_field#cite_note-hammer-5)
* Frozen ground may seasonally reduce the cross-sectional area available for flow or evaporation.

**[**[**edit**](http://en.wikipedia.org/w/index.php?title=Septic_drain_field&action=edit&section=2)**] Dosing schedules or resting periods**

A drain field may be designed to offer several separate disposal areas for effluent from a single septic tank. One area may be "rested" while effluent is routed to a different area. The [nematode](http://en.wikipedia.org/wiki/Nematode) community in the resting drain field continues feeding on the accumulated biofilm and fats when the anaerobic septic tank effluent is no longer available. This natural cleansing process may improve hydraulic capacity of the field by increasing available interstitial area of the soil as accumulated organic material is oxidized. The resting improvement may approach, but is unlikely to exceed, the original clean water percolation rate of the site.

**[**[**edit**](http://en.wikipedia.org/w/index.php?title=Septic_drain_field&action=edit&section=3)**] Catabolic design**

Just as the septic tank is sized to support a community of anaerobic organisms capable of liquifying anticipated amounts of putresible materials in wastewater, the drain field should be sized to support a community of aerobic soil [microorganisms](http://en.wikipedia.org/wiki/Microorganisms) capable of [decomposing](http://en.wikipedia.org/wiki/Decomposition) the anaerobic septic tank's effluent into aerobic water. [Hydrogen sulfide](http://en.wikipedia.org/wiki/Hydrogen_sulfide) odors or [iron bacteria](http://en.wikipedia.org/wiki/Iron_bacteria) may be observed in nearby wells or surface waters when effluent has not been completely oxidized prior to reaching those areas.[[6]](http://en.wikipedia.org/wiki/Septic_drain_field#cite_note-hammer-5) The biofilm on the walls of the drain field trenches will use atmospheric [oxygen](http://en.wikipedia.org/wiki/Oxygen) in the trenches to catabolize organic compounds in septic tank effluent. Groundwater flow is [laminar](http://en.wikipedia.org/wiki/Laminar_flow) in the aquifer soils surrounding the drain field.[[7]](http://en.wikipedia.org/wiki/Septic_drain_field#cite_note-6) Septic tank effluent with soluble organic compounds passing through the biofilm forms a mounded lens atop groundwater underlying the drain field. [Molecular diffusion](http://en.wikipedia.org/wiki/Molecular_diffusion) controls mixing of soluble organic compounds into groundwater and transport of oxygen from underlying groundwater or the [capillary fringe](http://en.wikipedia.org/wiki/Capillary_fringe) of the groundwater surface to micro-organisms capable of catabolizing dissolved organic compounds remaining in the effluent plume.[[8]](http://en.wikipedia.org/wiki/Septic_drain_field#cite_note-7)

**[**[**edit**](http://en.wikipedia.org/w/index.php?title=Septic_drain_field&action=edit&section=4)**] Biofilter**

When a [septic tank](http://en.wikipedia.org/wiki/Septic_tank) is used in combination with a [biofilter](http://en.wikipedia.org/wiki/Biofilter), the height and catabolic area of the drain field may be reduced. This technology may allow higher density residential construction, minimal site disturbance, more usable land for trees, swimming pools, or gardens. With adequate routine maintenance it may reduce the chances of the drain field plugging up. The biofilter will not reduce the volume of liquid that must percolate into soil, but it may reduce the oxygen demand of organic materials in that liquid.

**[**[**edit**](http://en.wikipedia.org/w/index.php?title=Septic_drain_field&action=edit&section=5)**] Inappropriate wastes**

[](http://en.wikipedia.org/wiki/File:Klamath_Septic_Leach_Field.JPG)

[http://bits.wikimedia.org/skins-1.5/common/images/magnify-clip.png](http://en.wikipedia.org/wiki/File:Klamath_Septic_Leach_Field.JPG)

Septic drain field exposed by flood damage.

Septic tank and drain field microorganisms have very limited capability for catabolizing petroleum products and [chlorinated solvents](http://en.wikipedia.org/wiki/Organochloride), and cannot remove dissolved [metals](http://en.wikipedia.org/wiki/Metals); although some may [sorb](http://en.wikipedia.org/wiki/Sorption) onto septic tank sludge or drain field soils, and concentrations may be diluted by other groundwater in the vicinity of the drain field. Cleaning formulations may reduce drain field efficiency. Laundry [bleach](http://en.wikipedia.org/wiki/Bleach) may slow or stop microbial activity in the drain field, and [sanitizing](http://en.wikipedia.org/wiki/Disinfectant) or deodorizing chemicals may have similar effects. Detergents, solvents and [drain cleaners](http://en.wikipedia.org/wiki/Drain_cleaner) may transport [emulsified](http://en.wikipedia.org/wiki/Emulsion), [saponified](http://en.wikipedia.org/wiki/Saponification) or dissolved fats into the drain field before they can be catabolized to short-chain organic acids in the septic tank scum layer.[[6]](http://en.wikipedia.org/wiki/Septic_drain_field#cite_note-hammer-5)

**[**[**edit**](http://en.wikipedia.org/w/index.php?title=Septic_drain_field&action=edit&section=6)**] See also**

* [Blackwater (waste)](http://en.wikipedia.org/wiki/Blackwater_%28waste%29)
* [Cesspit](http://en.wikipedia.org/wiki/Cesspit)
* [French drain](http://en.wikipedia.org/wiki/French_drain)
* [Leachate](http://en.wikipedia.org/wiki/Leachate)
* [Sewer](http://en.wikipedia.org/wiki/Sanitary_sewer)
* [Sewage treatment](http://en.wikipedia.org/wiki/Sewage_treatment)
* [Septic tank](http://en.wikipedia.org/wiki/Septic_tank)
* [Weeping tile](http://en.wikipedia.org/wiki/Weeping_tile)

http://en.wikipedia.org/wiki/Septic\_drain\_field